

Exploration of the Project-Based Teaching Model for the HTML5 Application Development Fundamentals Course under the Concept of Outcome-Based Education

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Abstract: The Outcome-Based Education (OBE) concept emphasizes a student-centered, learning-outcomes-oriented approach, providing important theoretical support for vocational education curriculum reform. As a core foundational course in Software Technology, the traditional teaching model of HTML5 Application Development Fundamentals suffers from problems such as disconnection between theory and practice and misalignment between teaching content and job requirements. Based on the OBE concept, this paper constructs a "backward design, forward implementation" project-based teaching model for the course, systematically exploring aspects including job requirement analysis, learning outcome identification, teaching content reconstruction, project system design, and establishment of diversified evaluation mechanisms. Research demonstrates that the project-based teaching model based on OBE concept can effectively enhance students' HTML5 application development abilities, professional competencies, and innovative thinking, providing a referable paradigm for teaching reform in computer-related courses.

Keywords: Outcome-Based Education, HTML5 Application Development, Project-Based Teaching, Teaching Model.

1. Introduction

Outcome-Based Education (OBE), proposed by American scholar Spady, is centered on the core concept that "all students can learn and succeed." It emphasizes student-centeredness, with instructional design and activities focused on the learning outcomes students achieve upon completion of their studies, encompassing three dimensions: knowledge, ability, and affect [1].

HTML5 Application Development Fundamentals is a core foundational course in Software Technology and a key course bridging to the professional competencies of front-end development engineer positions. As a new generation of web development technology, HTML5 features rich functionality, good compatibility, and strong interactivity, and has become the mainstream tool for modern web application development. However, traditional teaching models suffer from the following problems: first, single teaching method centered on knowledge point explanation, lacking close connection with the industry; second, disconnection between teaching content and job requirements, making it difficult for students to adapt to enterprise demands; third, weak practical components, with students lacking real project development experience [1].

Against this background, how to combine the OBE concept with project-based teaching to construct a course teaching model that meets the talent cultivation needs of the new era has become an important research topic in urgent need of exploration.

2. Core Connotation of OBE Concept and Its Value for Curriculum Reform

2.1. Core Connotation of OBE Concept

The OBE concept emphasizes four core questions: what learning outcomes do we want students to achieve; why do

we want students to achieve these learning outcomes; how can we help students achieve these learning outcomes; how can we know that students have achieved these learning outcomes. Its key characteristics include: outcome-orientation—all teaching activities are designed with final learning outcomes as the starting point; student-centeredness—fully respecting students' subject status in the teaching process; backward design—reverse-deriving course objectives, teaching content, and evaluation methods from expected learning outcomes; and continuous improvement—continuously optimizing teaching through evaluative feedback.

2.2. Guiding Value of OBE Concept for Curriculum Reform

In the field of vocational education, the OBE concept is highly compatible with the "competence-based" orientation of talent cultivation [3]. Curriculum reform based on the OBE concept can solve the problem of disconnection between traditional teaching and industrial needs, ensuring that what students learn in school meets the requirements of enterprise positions and that they receive practical training and competency development related to actual company projects. For a highly practical course like HTML5 Application Development Fundamentals, the OBE concept emphasizes four core questions: what learning outcomes do we want students to achieve; why do we want students to achieve these learning outcomes; how can we help students achieve these learning outcomes; how can we know that students have achieved these learning outcomes.

3. Analysis of Current Course Teaching Status

3.1. Course Positioning and Teaching Requirements

The HTML5 Application Development Fundamentals course aims to equip students with basic knowledge of HTML5, CSS3, and JavaScript, enabling them to apply relevant technologies to design and produce web pages reasonably and possess front-end page development capabilities. The course requires students to understand Web front-end design specifications, master HTML document structure and basic tag usage, be familiar with CSS style design and page layout, and possess interactive function implementation capabilities.

3.2. Main Problems in Current Teaching

Through teaching research, three prominent problems have been identified in current course teaching. First, there is a gap between teaching content and job requirements. Current teaching emphasizes knowledge point instruction without effectively aligning with the specific requirements of enterprise positions. HTML5 front-end development engineers need to master comprehensive abilities such as requirements analysis, page construction, and interaction design, but traditional classrooms mostly stay at the level of grammar explanation. Second, project-based teaching lacks systematic design. Although some classes have introduced project practice, the projects are mostly isolated practice tasks lacking systematic design throughout the course, making it difficult to form a progressive ability cultivation chain. Third, the evaluation method is single. Traditional final examinations cannot comprehensively reflect students' practical abilities, innovative capabilities, and teamwork skills, lacking continuous attention to and feedback on students' learning processes.

4. Construction of the Project-Based Teaching Model

4.1. Backward Design

Based on the OBE concept, curriculum design follows the principle of "backward design, forward implementation." Backward design starts from expected learning outcomes and reverse-derives course objectives, teaching content, teaching methods, and teaching evaluation.

First, conduct job requirement analysis. Through research on recruitment websites and enterprises, summarize the typical work tasks and job responsibilities of HTML5 front-end development engineers, including taking responsibility for front-end page design and development, using HTML5 technology for page production, solving front-end page display performance issues, and selecting appropriate front-end technology frameworks based on requirements.

Based on job analysis, determine the learning outcome objectives of the course covering three dimensions: knowledge, ability, and quality. Knowledge objectives include mastering the use of development tools such as VSCode; possessing knowledge of HTML5 page structure design; mastering CSS3 style design knowledge; and possessing knowledge of JavaScript and jQuery applications. Ability objectives include possessing color matching and design capabilities; interactive design capabilities; front-end

page framework construction and implementation capabilities; and information retrieval capabilities. Quality objectives include cultivating a rigorous work attitude; analytical and problem-solving thinking abilities; communication and teamwork capabilities; and innovative spirit and service awareness [4].

4.2. Teaching Content Reconstruction and Project System Design

Based on the OBE concept, course content is designed according to the enterprise talent requirements corresponding to students' majors. A running project approach is adopted for teaching, selecting real enterprise projects as teaching carriers, decomposing projects into several teaching modules, each corresponding to clear knowledge points and cultivation objectives [5].

The course constructs a three-tier progressive project system of "foundation level — advancement level — comprehensive level." Foundational training projects focus on imitation to solidify coding standards, covering core knowledge points such as HTML tags, CSS basic styles, and simple page layouts. Advanced improvement projects focus on adaptation to cultivate transfer capabilities, covering CSS advanced layout, floating and flex layout, and simple interactive pages. Enterprise-level comprehensive projects focus on original creation to exercise engineering thinking, involving responsive web design, complete project development processes, and teamwork. Each project includes clear outcome objectives, task decomposition, and implementation requirements.

4.3. Innovation in Teaching Methods

Adopt a "project-driven, task-oriented" teaching method, integrating project tasks throughout the teaching process. Each project is decomposed into multiple tasks, each containing five links: "task objective — task introduction — task explanation — task consolidation — task expansion." Classroom teaching implements an integrated model of "learning, doing, teaching, and improving."

Before class, teachers send learning tasks and micro-lecture videos through information-based teaching platforms, and students complete previews in advance. During class, a group collaboration format is adopted: students first independently explore project modules, and teachers then provide focused lectures and demonstrations, guiding students to analyze and solve problems. After class, students complete expansion tasks to consolidate their knowledge. Teachers play the role of guides and mentors during the teaching process, and students work in project teams to complete project development through division of labor, collaboration, and peer review.

4.4. Diversified Teaching Evaluation System

Establish a diversified teaching evaluation system compatible with the OBE concept [6], combining process-oriented evaluation with summative evaluation [1]. Process-oriented evaluation includes classroom performance, project milestone achievements, peer evaluation, etc., accounting for 60% of the total score. Summative evaluation includes project outcome presentations and defenses, accounting for 40% of the total score.

Evaluation dimensions encompass three aspects: project completion quality, including functional implementation completeness, code standardization, and page aesthetics;

development process performance, including requirements analysis capability, progress management capability, and teamwork performance; innovation and expansion, including technological application innovation and problem-solving ability. Multiple evaluation subjects are introduced, including teacher evaluation, peer evaluation, and enterprise mentor evaluation, ensuring the objectivity and comprehensiveness of evaluation results.

5. Teaching Practice Effects

5.1. Practice Process

The research team selected two parallel classes in the Software Technology major to conduct a comparative teaching experiment. The experimental class adopted the project-based teaching model based on the OBE concept, while the control class adopted the traditional teaching model. After a semester of teaching practice, a comparative analysis of the learning effects of students in the two classes was conducted [2].

5.2. Effect Analysis

Experimental data show that students in the experimental class outperformed the control class across multiple dimensions. In terms of project completion quality, students in the experimental class showed significantly improved code standardization, and their page designs better conformed to enterprise specifications. In terms of autonomous learning ability, the proportion of students in the experimental class actively consulting technical documentation after class increased significantly. In terms of teamwork ability, through group project practice, students' communication skills and sense of responsibility were enhanced. Additionally, students in the experimental class reported significantly higher course satisfaction than those in the control class, believing that project-based teaching was more aligned with actual work scenarios.

6. Conclusion

Based on the OBE concept, this study has constructed a project-based teaching model for the HTML5 Application Development Fundamentals course, systematically exploring aspects including job requirement analysis, learning outcome identification, project system design, teaching implementation strategies, and diversified evaluation mechanisms. Practice has demonstrated that this model can effectively enhance students' HTML5 application

development abilities, professional competencies, and innovative thinking, achieving effective alignment between course teaching and job requirements.

Future research will be further deepened in the following three aspects: first, continuously update project cases, keeping pace with HTML5 technology frontiers to maintain alignment between teaching content and industrial needs; second, strengthen school-enterprise cooperation, introducing more real enterprise projects to enhance students' job adaptability; third, improve the evaluation system, further refine competency evaluation indicators, explore value-added evaluation methods, and focus on individual students' growth changes.

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